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June 01, 2004

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APPLICATION NUMBER: *60/457,963*
FILING DATE: *March 27, 2003*
RELATED PCT APPLICATION NUMBER: *PCT/US04/09112*

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

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Certifying Officer

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03/27/03 JC685 U.S. PTO

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PTO/SB/16 (2-01)
Approved for use through 10/31/2002. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Docket Number: 220032

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(c).

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
David C.	Huffman	Merrimack, New Hampshire

☐ *Additional inventors are being named on the* *separately numbered sheets attached hereto.*

U.S. PTO 60/457963 03/27/03

TITLE OF THE INVENTION (280 characters max)

MODULAR SPRAY GUN WITH MULTIPLE CONTROL MODULES

CORRESPONDENCE ADDRESS

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PATENT TRADEMARK OFFICE

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ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification *Number of Pages:* 5 *(including any claims and abstract)*	☒ Power of Attorney
☒ Drawings *Number of Sheets:* 9	☐ Assignment
☒ Application Data Sheet. See 37 CFR 1.76	☐ CD(s), Number
	☐ Other (specify)

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☐ Applicant claims small entity status. See 37 CFR 1.27.
☐ A check or money order is enclosed to cover the filing fee(s).
☒ The Commissioner is hereby authorized to charge filing fee(s) or credit any overpayment to Deposit Account Number 12-1216. A duplicate copy of this communication is enclosed for that purpose.
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FILING FEE AMOUNT: $160.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government:
☒ No.
☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

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CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this correspondence and the documents referred to as attached or enclosed therein are being deposited with the United States Postal Service on March 27, 2003, in an envelope as "EXPRESS MAIL POST OFFICE TO ADDRESSEE" service under 37 CFR 1.10, Mailing Label Number EV 195511526 US, addressed to: Commissioner for Patents, Washington, D.C. 20231.

Wilma Del Nagro
Typed or Printed Name of Person Making Deposit

Signature of Person Making Deposit

Application Data Sheet

APPLICATION INFORMATION

Application Number::	
Filing Date::	
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Subject Matter::	Utility
Suggested classification::	
Suggested Group Art Unit::	
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Number of Copies of CDs::	
Sequence Submission?::	
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Number of Copies of CRF::	
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Total Drawing Sheets::	9
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Petition Type::	
Licensed US Govt. Agency::	
Contract or Grant Numbers::	
Secrecy Order in Parent Appl.?::	No

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DOMESTIC PRIORITY INFORMATION

Application::	Continuity Type::	Parent Application::	Parent Filing Date::

FOREIGN APPLICATION INFORMATION

Country::	Application Number::	Filing Date::	Priority Claimed

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State or Province of mailing address::	Illinoisi
Country of mailing address::	US
Postal or Zip Code of mailing address::	60189-7900

Attorney Docket No.
220032

PATENT APPLICATION

Invention Title:
MODULAR SPRAY GUN WITH MULTIPLE CONTROL MODULES

Inventors:

INVENTOR'S NAME	CITIZENSHIP	CITY OF RESIDENCE	STATE or FOREIGN COUNTRY
HUFFMAN, David C.	US	Merrimack	New Hampshire

Be it known that the inventors listed above have invented a certain new and useful invention with the title shown above of which the following is a specification.

MODULAR SPRAY GUN WITH MULTIPLE CONTROL MODULES

FIELD OF THE INVENTION

The present invention relates generally to liquid spray devices, and more particularly, to a spray gun or like liquid spray device having a spray nozzle assembly at the discharge end and control or actuating mechanism at an opposite end for controlling the liquid discharge from the spray nozzle assembly.

BACKGROUND OF THE INVENTION

Liquid spray guns are well known in the art, such as shown in U.S. Patent 5,707,010 assigned to the same assignee as the present application, which use air to assist in atomization and direction of the liquid spray and which have an actuator or control mechanism for further regulating the spray discharge. The spray nozzle assembly and control mechanism both typically are designed for the particular spray application. While it is customary to selectively establish the spray discharge pattern through use of a particular spray nozzle or tip, the spray actuator or control mechanism often does not permit easy or quick change over. Also, it often is desirable to use other accessory devices with such spray guns, which similarly are not easily adaptable to the spray gun.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the present invention to provide a modular constructed liquid spray gun that can be more versatilely used in different spray applications.

Another object is to provide a modular spray gun as characterized above in which both spray nozzle modules and control modules can be easily and quickly changed for a desired spray application.

A further object is to provide a modular spray gun of the above kind in which the control modules further may be easily replaced with other accessories to facilitate use and/or cleaning of the spray gun.

Still another object is to provide a modular spray gun of the foregoing type that has a plurality of standardized control modules or accessories adapted for interchangeable use with the spray gun.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a longitudinal section of an illustrated modular spray gun in accordance with the invention;

FIG. 1A is an exploded section of the spray gun shown in FIG. 1;

FIG. 2 is multiple views of the body of the illustrated spray gun; and

FIGS. 3-9 are longitudinal sections and exploded views similar to FIGS. 1 and 1A, depicting the spray gun with use of various alternative standardized control modules and accessories in accordance with the invention.

While the invention is susceptible of various modifications and alternative constructions, certain illustrated embodiments thereof have been shown in the drawings and will be described below in detail. It should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more particularly to FIG. 1 of the drawings, there is shown an illustrative modular spray gun 10 in accordance with the invention, comprising a spray gun body 11 having a spray nozzle assembly or module 12 at a discharge end and a control module 14 at an opposite end thereof for controlling the liquid spray discharge from the nozzle assembly 12. The basic structure and mode of operation of the spray gun are known in the art, for example, as shown in the aforementioned U.S. Patent 5,707,010.

The illustrated spray gun body 11, as best depicted in FIGS. 1 and 2, has an axial liquid flow passage 15 and a plurality of radial fluid passages. The radial passages include a liquid inlet port 16 for connection to a supply liquid to be sprayed and communicating with the liquid flow passage 15, an atomizing air inlet port 18 for connection to a pressurized air source or other pressurized fluid for assisting in atomization of the liquid to be sprayed, and a fan air inlet port 19 also for connection to a pressurized air source for assisting in direction and form of the discharging spray.

The spray nozzle assembly 12, as depicted in FIGS. 1 and 1A, comprises a spray tip 20, an air cap 21 mounted in surrounding relation to the discharge end of the spray tip 20, and a retaining ring 22 mounted on a downstream externally threaded hub 24 of the spray gun body 11. The spray tip 20 in this case has a forwardly extending nose portion 25 which defines a liquid discharge orifice and which extends axially into a central opening of the air cap 21 that defines an annular air discharge orifice through which the atomizing air directed to the spray gun discharges. The air cap 21 further defines opposed passages 26 through which fan air directed to the spray gun discharges to assist in forming of the discharge spray pattern, as is known in the art.

It will be understood that by removal of the retaining ring 22, the spray nozzle 12 assembly and/or a spray tip 20 thereof may be removed and replaced for a particular spray application. To facilitate such spray tip replacement, the illustrated spray tip 20 has a threadless union with the spray gun body 11 defined by concentric hubs 28, 29 each carrying a respective O-ring for interfitting within corresponding spray tip receiving bores 30, 31 of the nozzle body 11. To facilitate accurate positioning of the spray tip 20 within the spray gun body 11, the nozzle body 11 is formed with a downstream counterbore 34 which receives an annular radial flange 35 of the spray tip 20.

In accordance with an important aspect of the invention, the control module 14 is one of a plurality of standardized spray control modules or accessories that can be quickly and easily interchangeably mounted on the spray gun body 11 for enabling more versatile use of the spray gun for particular spray applications. The spray gun module 14 in this case includes a body member 40 which carries a shut-off valve needle 41 of a conventional type for reciprocating movement with respect to the spray

tip 20. The valve needle 41 has a piston assembly 42 at its opposite end which is biased in a valve closing position by a spring 44 retained within a cap 45 threadedly engaged with an upstream end of the body 40. The modular body 40 has a downstream relatively small diameter cylindrical hub portion 46 which carries an O-ring that is removably positionable within an upstream critical bore 48 of the spray gun body 11 with a threadless union. To facilitate accurate positioning of the module 14 in mounted position in the spray gun body 11, the spray gun body 11 has a counterbore 43 formed in the upstream end for receiving a cylindrical shoulder 47 of the module body 11.

For releasably securing the module 14 in mounted position, a retainer ring 50 is provided which threadably engages an upstream threaded hub portion 51 of the spray gun body 11. During operation, for axially moving the valve needle 41 to an open position (to the right as viewed in FIG. 1) against the force of the spring 44, control drive air or other fluid is supplied to an inlet port 54 of the module into a cylinder adjacent a forward side of the movable piston 42. As is known in the art, the control fluid, i.e., compressed air, may be controlled externally, such as by solenoid actuated valves, for controlling sequential opening of the valve needle 41. The threadless junction between the module 14 and the spray gun body permits easy removal and replacement of the module as an incident to removal of the retaining ring 50.

In carrying out the invention, a multiplicity of standardized modules and spray gun accessories may be used with the modular spray gun 10, as depicted in FIGS. 3-9. In FIG. 3, a control module 60 is shown which includes a module body 61 with a needle carrying piston 62 having a diaphragm seal 64 affixed to the upstream end of the module body 61. In this case, the module 60 is secured to the spray gun body 11 by the retaining ring 50 with an outer annular portion of the diaphragm seal 64 fixed between the body 11 and module 60. Again, the module 60 has a control air inlet port 65 for opening the valve against the biasing force of a spring 66.

FIG. 4 discloses a spray gun with a diaphragm sealed control module 70, similar to that shown in FIG. 3, but with a double air-actuatable piston 62. Air inlet lines in this case communicate through inlet ports 65, 71 for respectively moving the piston 62 and valve needle between open and closed positions.

FIG. 5 shows the modular spray gun with a control module 75, similar to that shown in FIGS. 3 and 4, but with a solenoid 76 for operating the needle valve between open and closed positions.

In further keeping with the invention, the modular spray gun can be used with various other accessories. To this end, as shown in FIG. 6, the spray gun is shown with an accessory receiving plug or plate 80 affixed thereto by the retaining ring 50. The accessory receiving plate 80 in this case has a central threaded bore 81, which can receive various standardized accessories, such as shown in FIGS. 7 and 8. In FIG. 7, a manually operated metering needle assembly 82 is shown which has an body 84 with forward threaded section 85 for engagement with the threaded plug passageway 81. The body 85 supports the metering needle 86, which can be adjustably positioned by a control knob 88 at the upstream end mounted within a threaded aperture 89 of a rearwardly extending housing 90 of the assembly 82. FIG. 8 shows a clean out needle assembly 92 affixed to the plate 80, which includes a clean out needle 94 that can be manually positioned to a forward clean out position through depression of a rearwardly extending actuating member 95 against the force of a biasing spring 96.

Finally, FIG. 9 shows the modular spray gun with backup plate 98 removably mounted on the end of the body 11, which enables the spray gun to be used in a liquid spray mode without a control module or accessory.

It can be seen from the foregoing that the modular spray gun of the invention is adapted for quick changeover use with any of a plurality of standardized control modules or accessories. In each case, quick removal and replacement of the control module or accessories is achieved through removal of the retaining ring.

PATENT
Attorney Docket No. 220032

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

David C. Huffman

☐ Application No.
☐ Filed

For: MODULAR SPRAY GUN WITH MULTIPLE CONTROL MODULES

POWER OF ATTORNEY FOR PROVISIONAL APPLICATION

Each inventor, identified above and signing below, hereby appoints Leydig, Voit & Mayer, Ltd. to prosecute this application and transact all business in the U.S. Patent and Trademark Office connected therewith: Customer Number: 23460.

23460

PATENT TRADEMARK OFFICE

Correspondence concerning this application should be directed to Leydig, Voit & Mayer, Ltd.: Customer Number 23460.

23460

PATENT TRADEMARK OFFICE

Each inventor, identified above and signing below, authorizes the above-named attorneys to accept and follow instructions from our representatives.

Date: 3-27-03

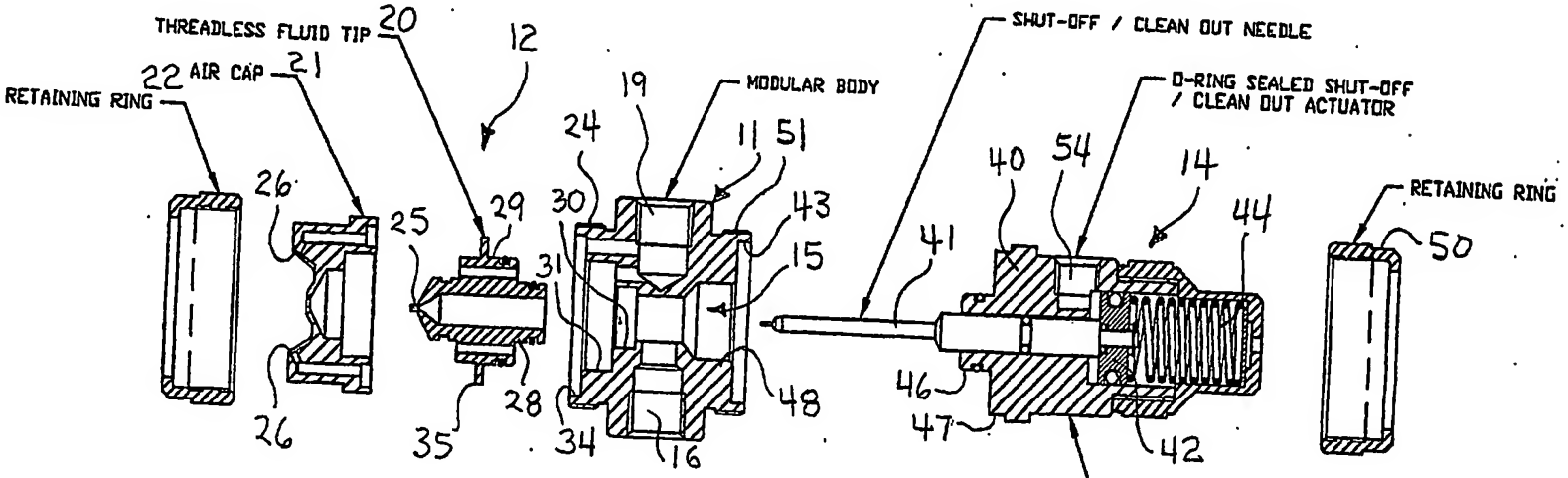
David C. Huffman

Provisional Power (Rev. 2/1/2001)

RECEIVED TIME MAR. 27. 11:52AM

[redacted]

FIG. 1



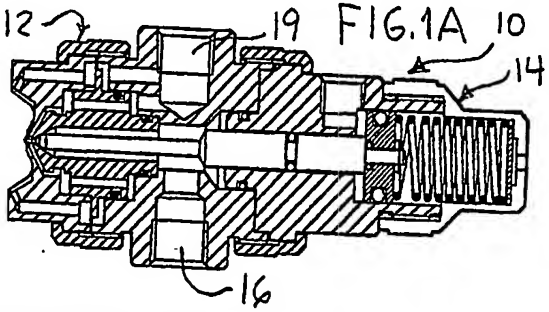


FIG. 1A

SINGLE ACTION CYLINDER
AIR TO OPEN AND SPRING TO CLOSE

MODULAR ASSEMBLY WITH O-RING SEALED ACTUATOR

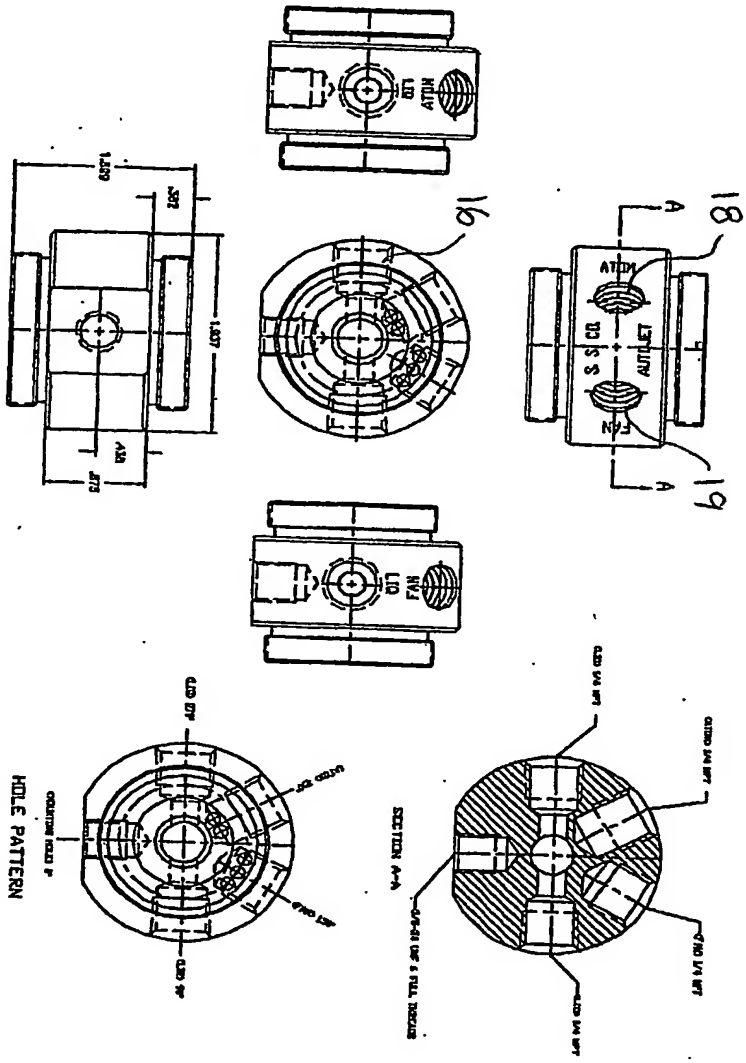
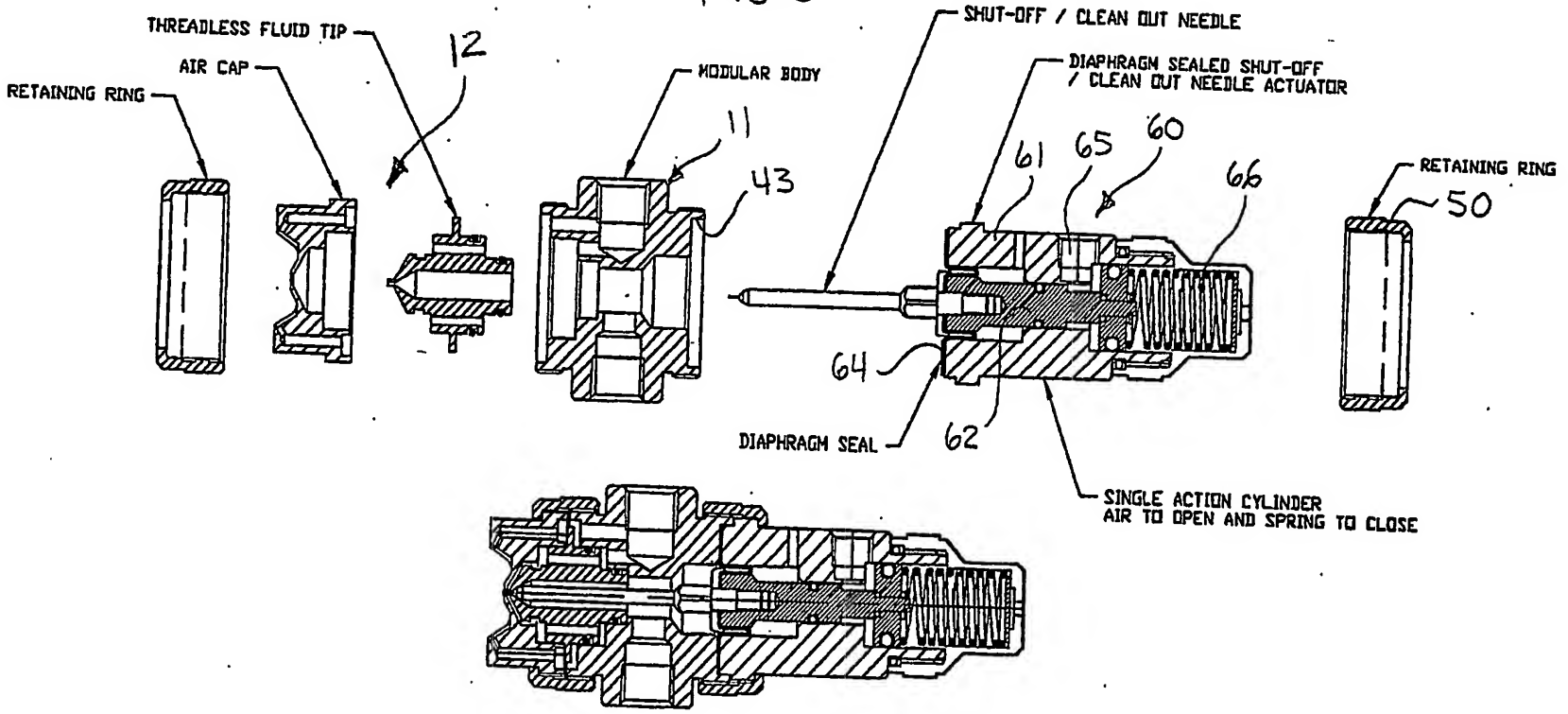


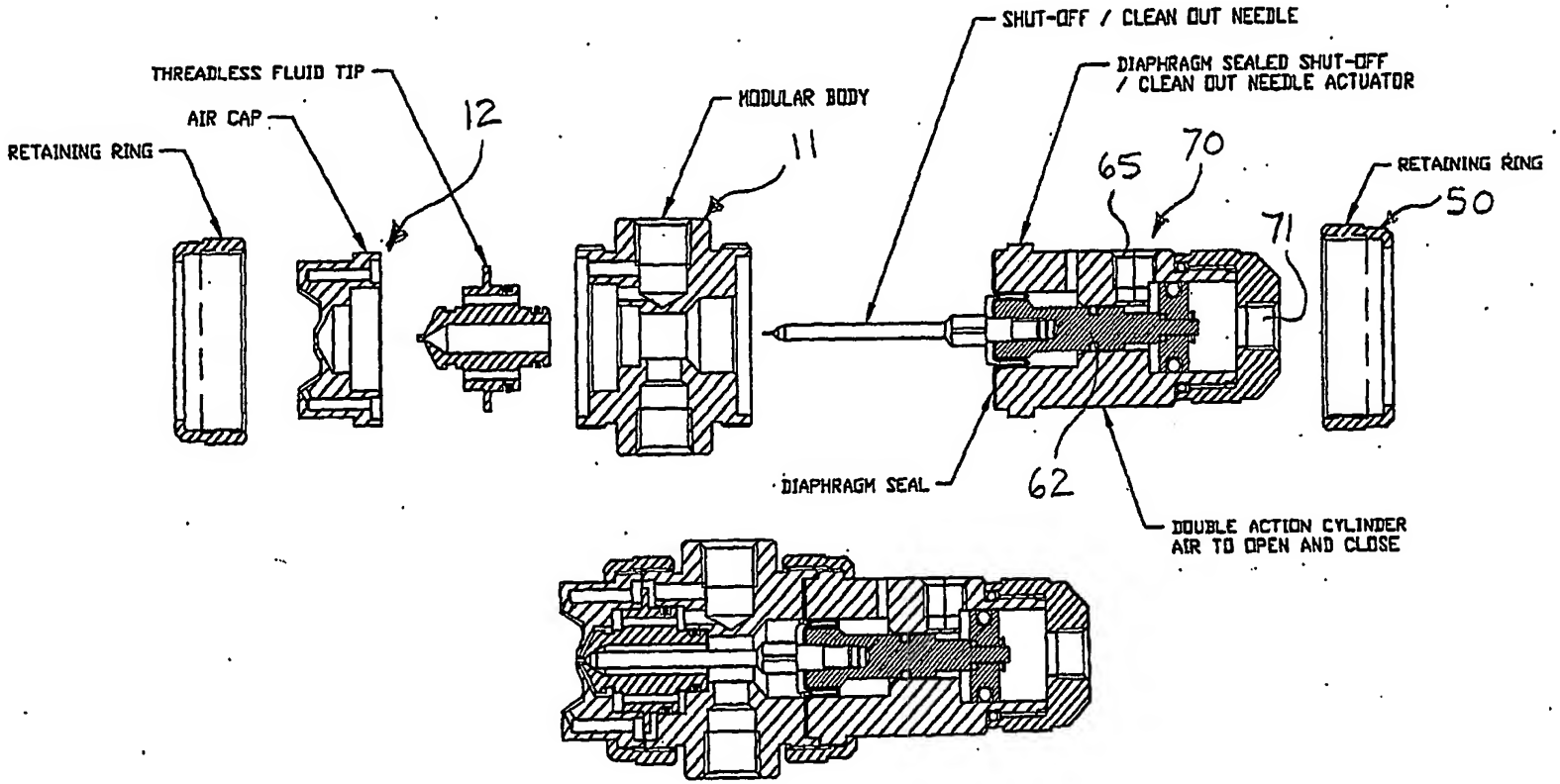
FIG. 2

FIG.3



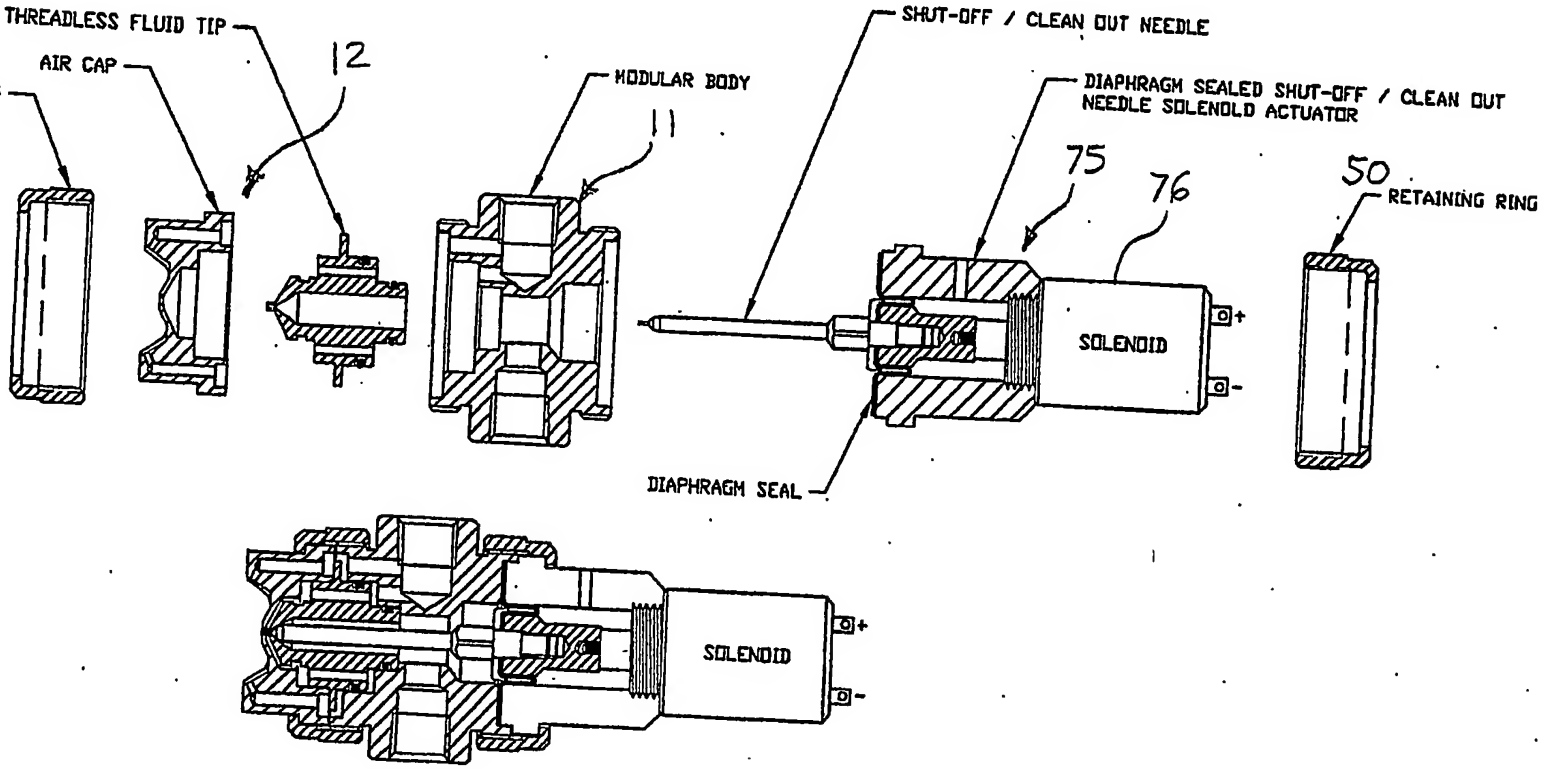
MODULAR ASSEMBLY WITH DIAPHRAGM SEALED SINGLE ACTION ACTUATOR

FIG. 4



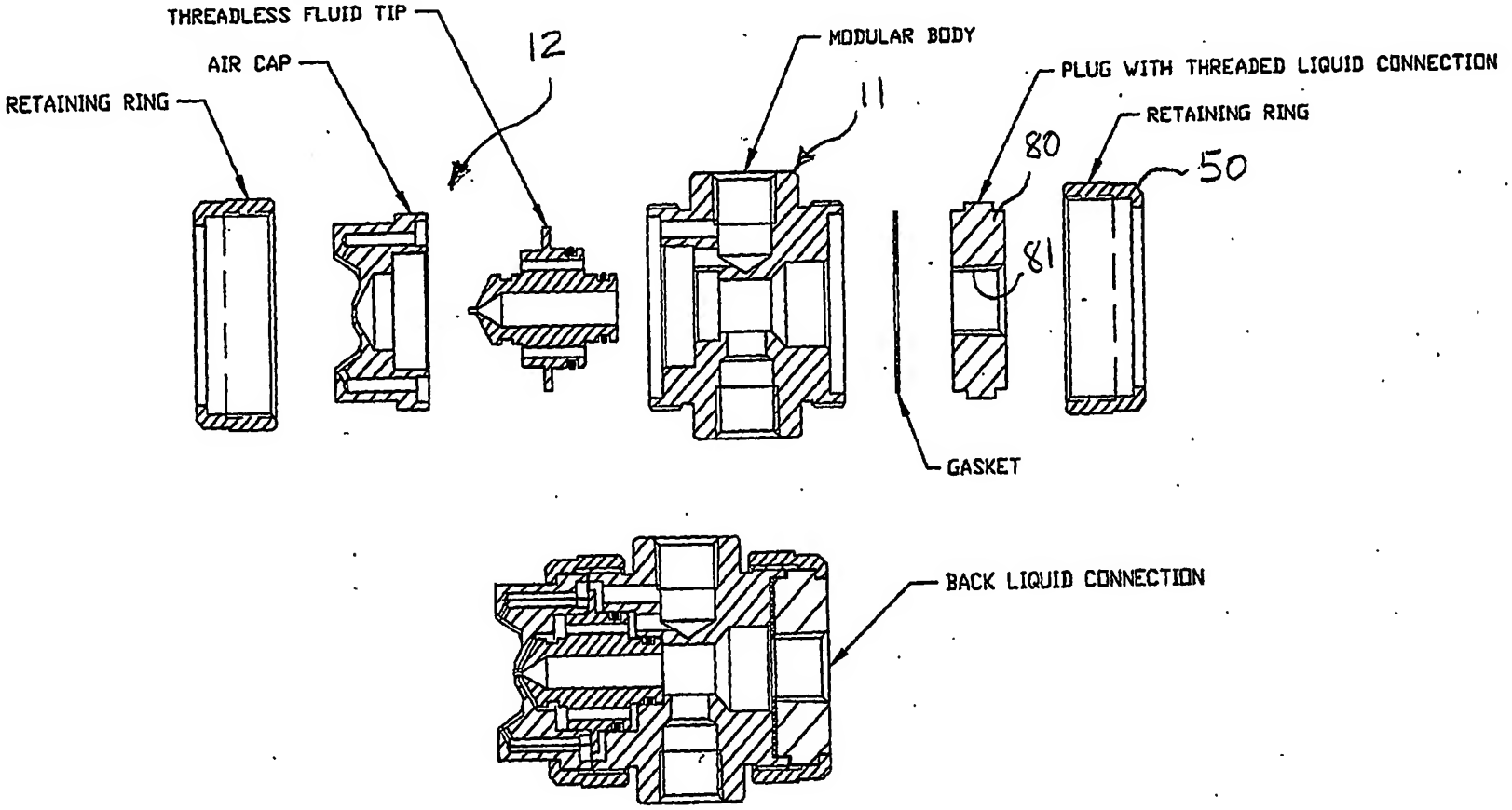
MODULAR ASSEMBLY WITH DIAPHRAGM SEALED DOUBLE ACTION ACTUATOR

FIG. 5



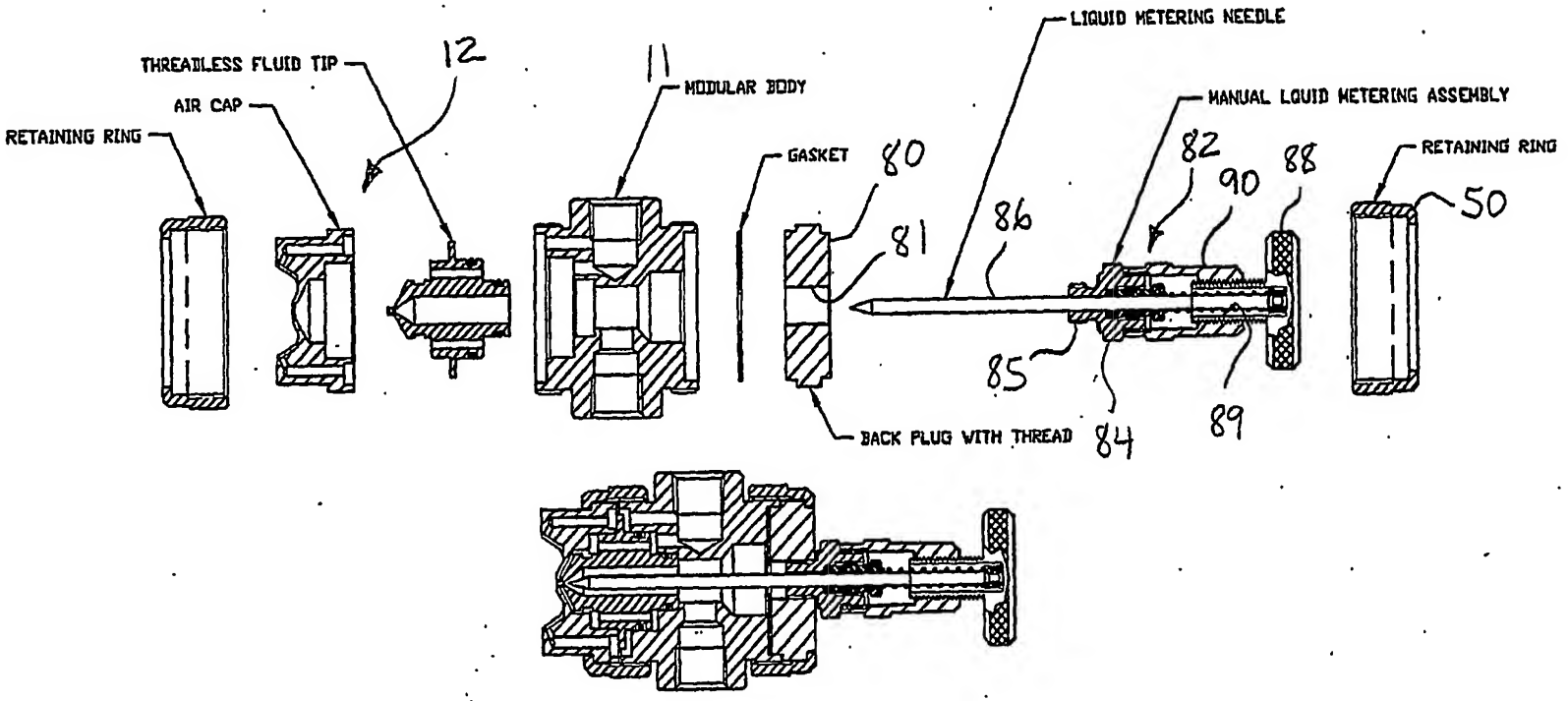
MODULAR ASSEMBLY WITH DIAPHRAGM SEALED SINGLE ACTION SOLENOID ACTUATOR

FIG. 6



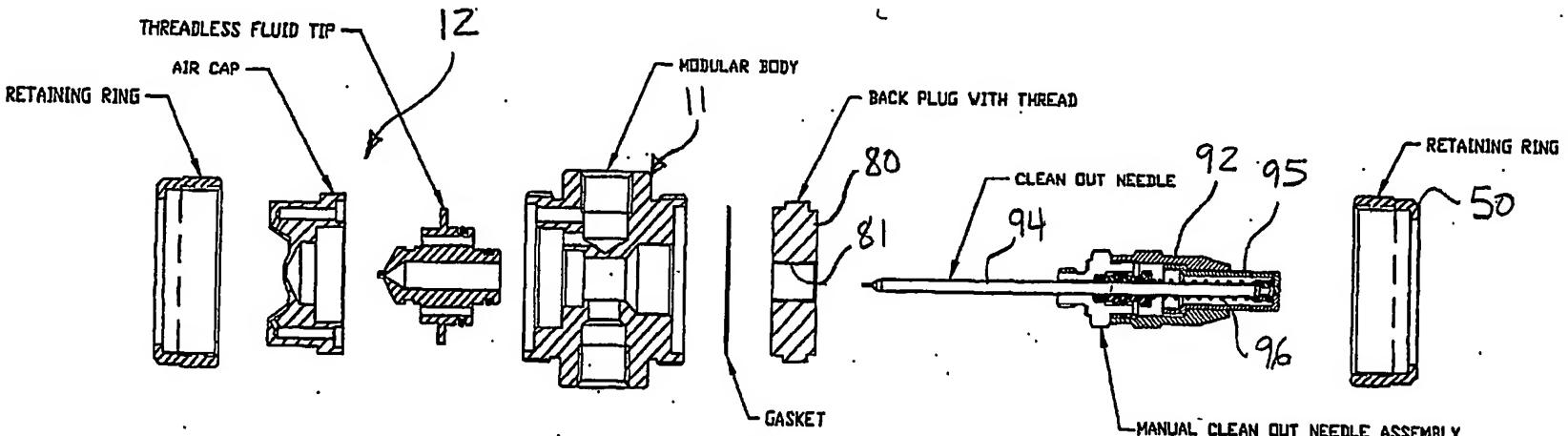
MODULAR ASSEMBLY WITH LIQUID CONNECTION BACK PLUG

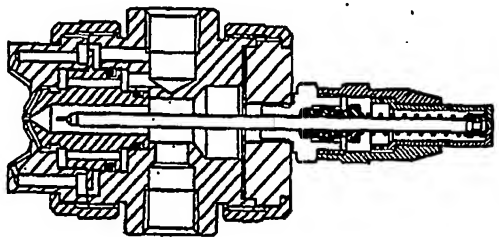
FIG. 7



MODULAR ASSEMBLY WITH MANUAL LIQUID METERING NEEDLE

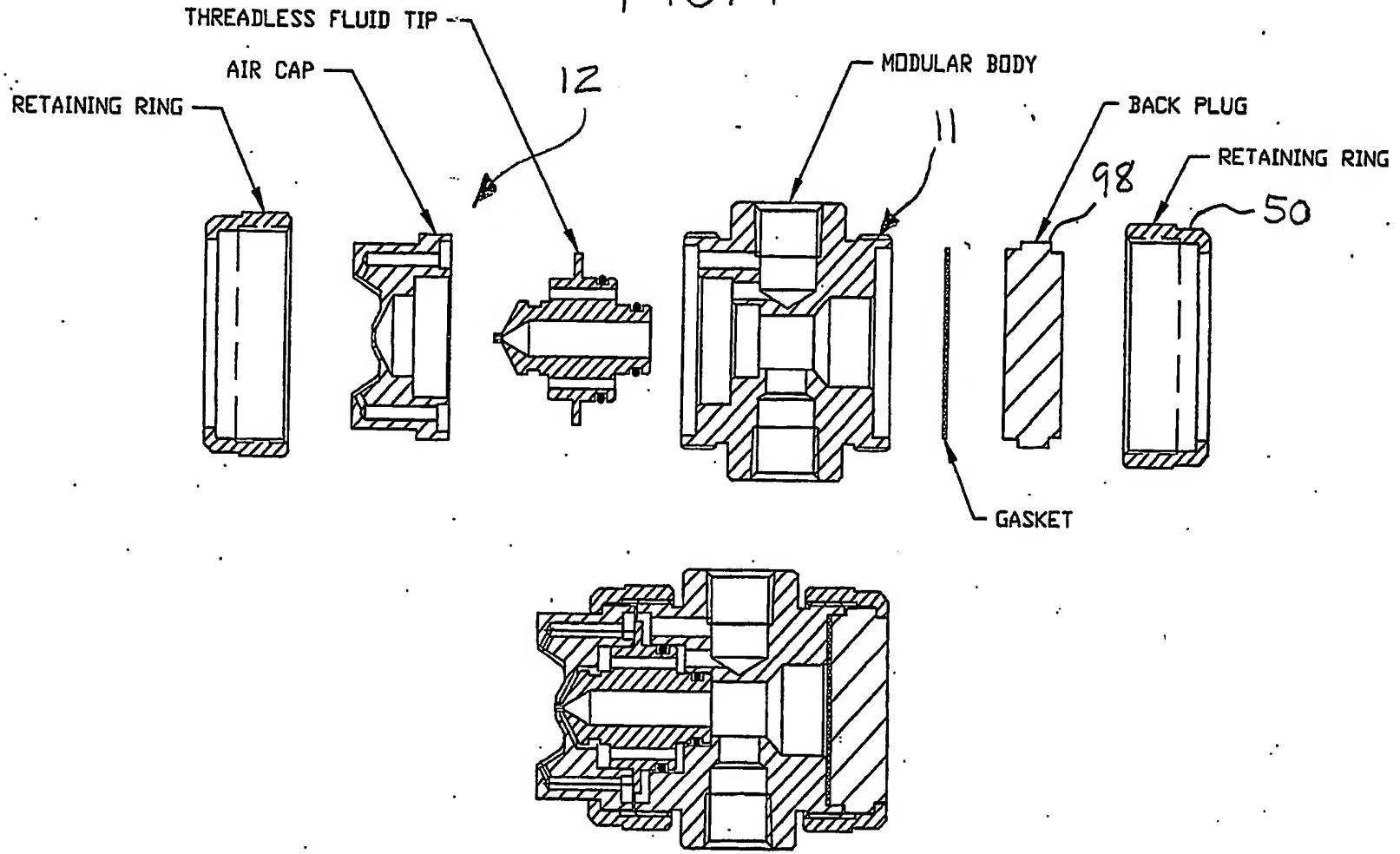
FIG. 8





MODULAR ASSEMBLY WITH MANUAL CLEAN OUT NEEDLE

FIG. 9



BASIC MODULAR ASSEMBLY WITH BACK PLUG

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